The City of Longview Washington
P.O. Box 128
Longview, WA 98632-7080
www.mylongview.com

August 14, 2008

Jeff Marti
Water Resources Program
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Subject: Application for Transfer of Water Right S2-29641

Dear Jeff:

Please find the completed application attached requesting transfer of the City of Longview unperfected water right S2-29641. In accordance with RCW 90.03.570, unperfected surface water rights for a municipal water supply may be changed or transferred for any purpose if they meet certain criteria including, but not limited to, those established in RCW 90.03.580.

Included with this application, please find a letter of endorsement from the Department of Health satisfying the requirements of RCW 90.03.580. The letter recognizes a state of jeopardy and the inability of the existing Regional Water Treatment Plant to meet projected Maximum Day Demand due to heavy sediment loading in the Cowlitz River. The Department of Health further states their support for the new water treatment facility to provide safe and reliable drinking water.

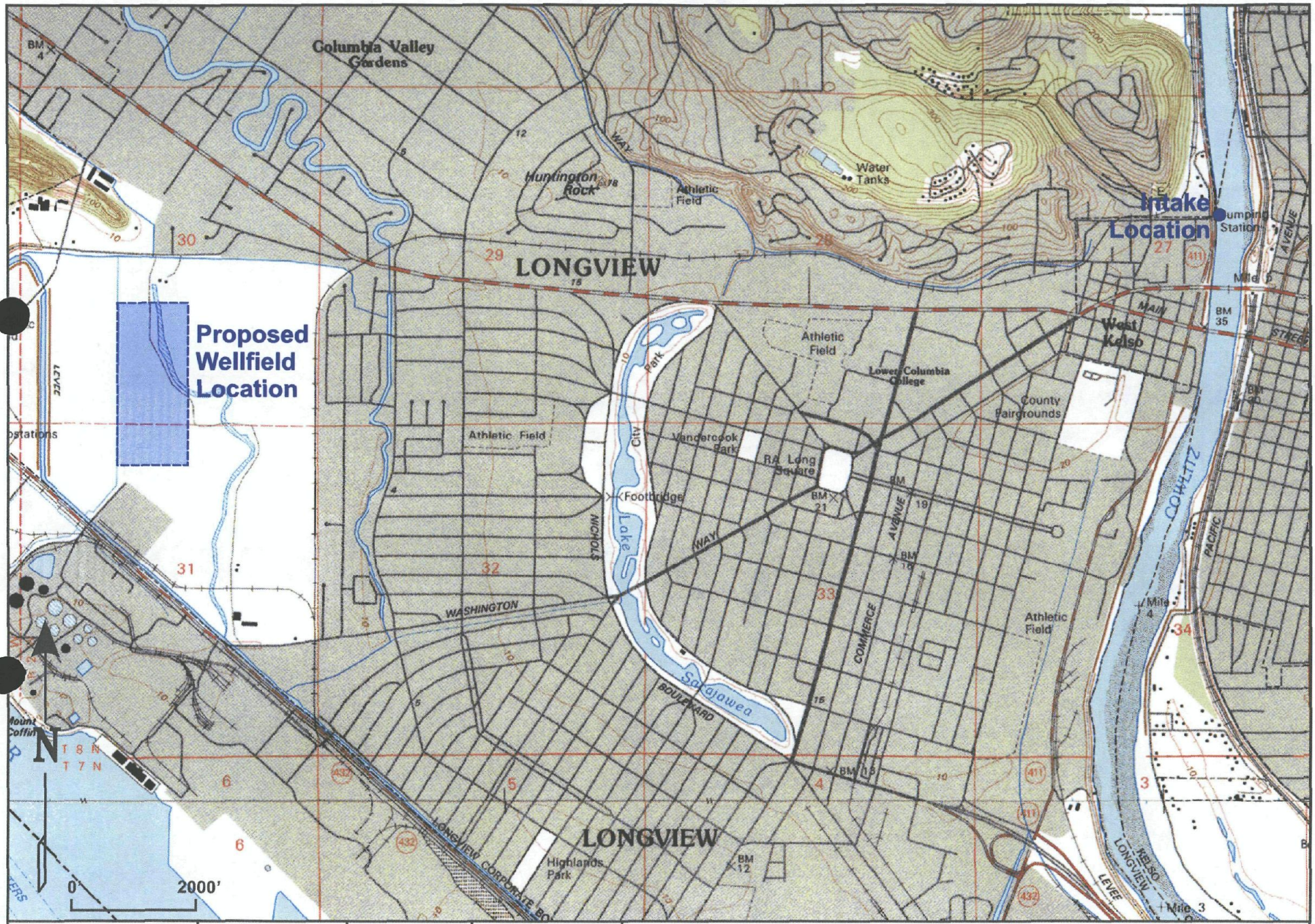
Please note this application should be processed under a Cost Reimbursement Contract and, as such, the standard $50.00 application fee is waived.

If you have questions, I can be reached at 360.442.5206 or amy.blain@ci.longview.wa.us.

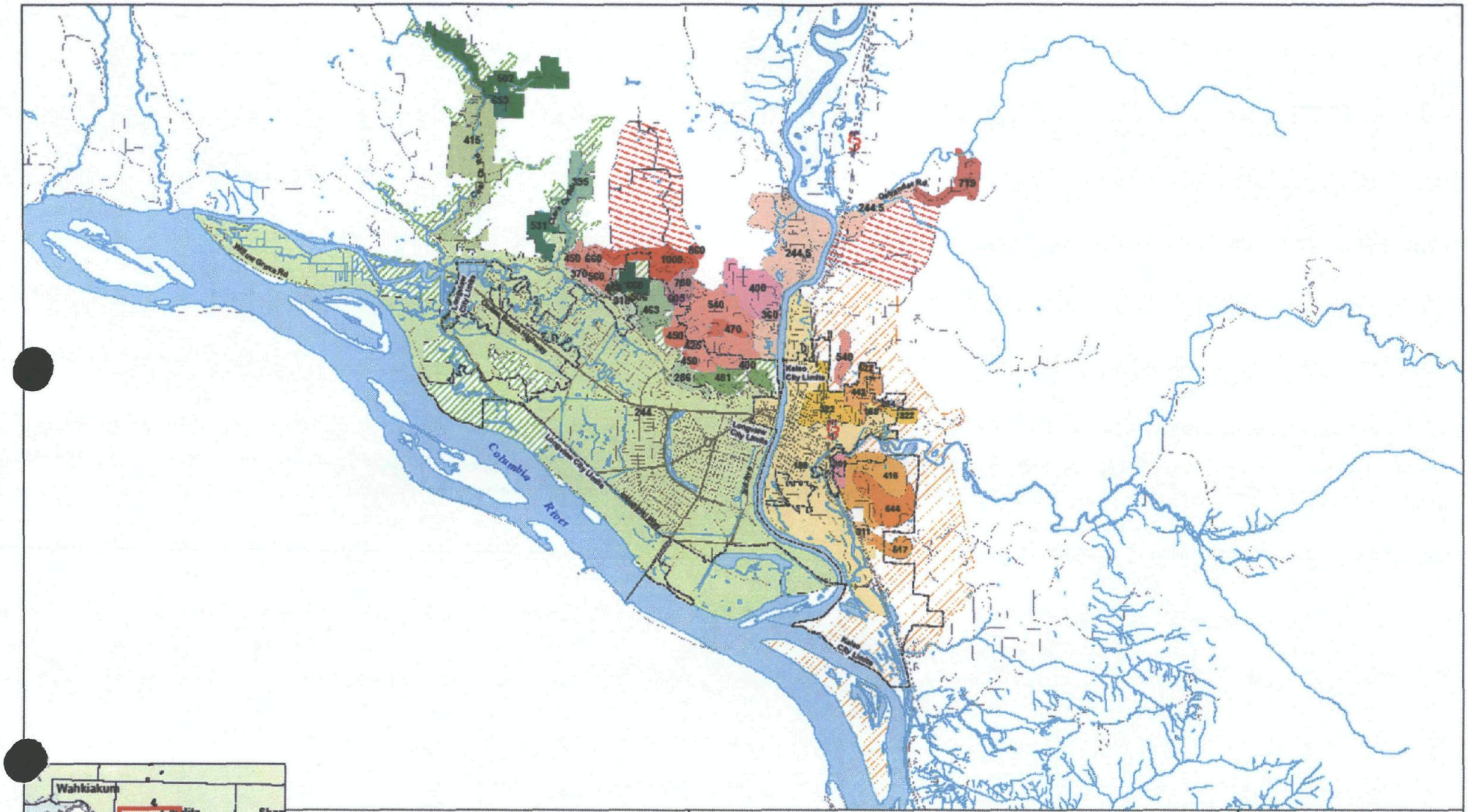
Best regards,

Amy Blain

Amy Blain, P.E.
Civil Engineer
City of Longview

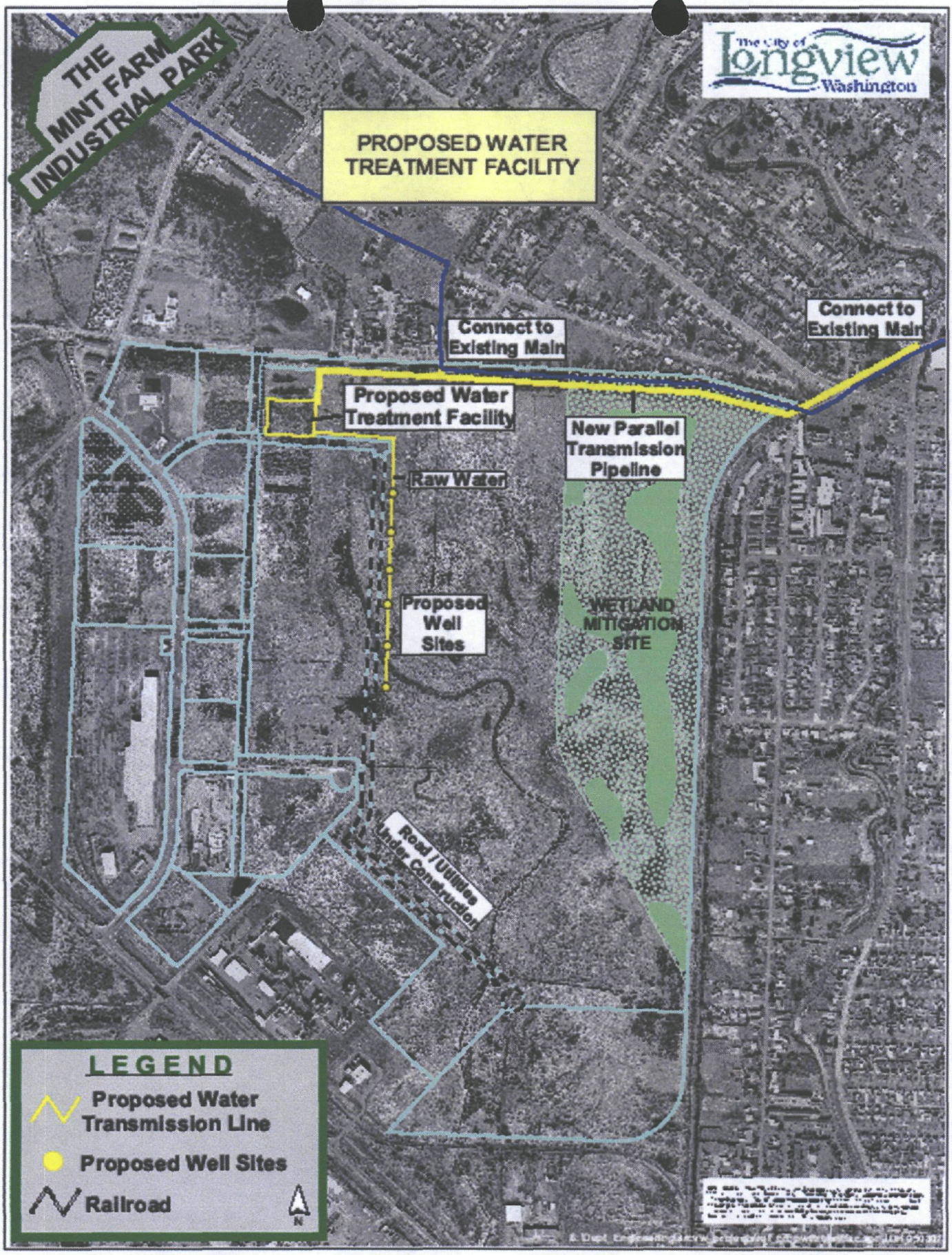


ROBINSON NOBLE SALTBUSH INC. GROUNDWATER & ENVIRONMENTAL SCIENTISTS	Note: Basemap taken from Kelso Quadrangle	PM: MFP August 2008 1556-002C	Cowlitz County T 08 N/R 02 W Scale 1" = 2000'	Figure 1 Proposed Wellfield and Existing Intake Location Map City of Longview: Water Right Transfer Application



File Path: J:\Projects\2004\Longview Water Plan\projects\FIG 1-1 Service Areas.mxd, Date: 09 29, 2005, Map Created By: Chris Surbey

August 2008	Cowlitz County	Figure 1-1 City of Longview & Cowlitz County PUD No. 1 Service Areas City of Longview: Water Right Transfer Application



August 2008	Cowlitz County T 8 N / R 2 W Section 30 / 31	Figure 1-2 Proposed Water Treatment Plant Location City of Longview: Water Right Transfer Application

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
Office of the Assistant Secretary
Division of Environmental Health
PO Box 47890 • Olympia, Washington 98504-7890
Tel: (360) 236-4501 • FAX: (360) 586-7424 • TDD Relay Service: 1-800-833-6388

Longview, City of
ID# 48100

February 13, 2008

The Honorable Kurt Anagnostou
Mayor, City of Longview
Post Office Box 128
Longview, Washington 98632

Dear Mayor Anagnostou:

The Washington State Department of Health is aware that the City of Longview is requesting $2 million in the FY09 Interior Appropriations bill to fund a new water treatment facility. We support this project to ensure water quality and public health are protected. We also recognize that federal funds for the facility are vital to help the city meet the significant cost of water treatment and alleviate the financial burden on its residents and local businesses.

The department's Office of Drinking Water has approved the city's water system plan update for the proposed new plant. This update demonstrates the existing regional water treatment plant will be unable to meet maximum daily demands by 2011, due to excessive grit and suspended solids entering the plant from the Cowlitz River. This increase in sediment is a result of continued impact from the 1980 Mt. St. Helens volcanic eruption.

In addition, sediment in the Toutle and Cowlitz Rivers is threatening to leave the water intake dry when river flows drop in the summer. Plant operators are continually struggling to handle the excessive volume of solids carried into the plant in the raw water, prevent mechanical failure due to the solids loading, and produce potable water to meet the community's demand. We appreciate that the city has taken steps to lessen the impact of the increased sediment; however, it appears it is no longer safe or cost effective to invest funds to maintain the existing facility.

We worked closely with your staff in the summer of 2006 when the current treatment plant experienced a failure. Longview staff struggled to maintain an adequate supply that met drinking water standards. During the past two winter's floods, turbidity in the Cowlitz reached extreme levels. As a result, the treatment plant was not able to operate efficiently and was again in jeopardy of sacrificing quality or quantity. While the city has done an excellent job responding to these situations, we believe this further reinforces the need for a new facility.

Again, the Department of Health supports the City of Longview's request for funding for a new water treatment facility. This project will help ensure safe and reliable drinking water for the nearly 40,000 consumers of Longview water.

If you have any questions, please contact Denise Clifford, Director of the Office of Drinking Water, at 360-236-3110 or by e-mail at denise.clifford@doh.wa.gov.

Sincerely,

Mary C. Selecky
Secretary

cc: Gregory Hannon, Longview Public Utilities
Audrey Shaver, Cowlitz County Health Department
Gregg Grunenfelder, Department of Health
Denise Clifford, Department of Health

City of Longview
Master Plan Amendment

I. Introduction

Potable water is provided to the City of Longview by the Regional Water Treatment Plant (Regional WTP) on Fisher's Lane. The plant is primarily owned and operated by the City of Longview, with partial ownership by the Cowlitz County Public Utility District No. 1 (Cowlitz PUD).

Potable water is delivered or "wheeled" to the Cowlitz PUD through connections with the City of Kelso distribution system. The City of Kelso also purchases some of their water from the regional plant.

II. Description of the Problem

A. Failures

The Regional WTP is a 60-year old conventional plant located on Fisher's Lane, close to the Cowlitz River. The raw water intake for the Regional WTP is across the West Side Road, on top of the dike wall adjacent to the river, from which the City draws its water. Over the last few years, the Regional WTP has experienced a series of mechanical and structural failures, including rupture of two of the eight filter underdrains, leaks in the concrete walls, and a series of intake pump failures caused by high raw water solids loading.

B. River Sediment

The last few years have also seen a rapid rise in the solids deposited on the river bottom, due to an increase in the discharge of sediments from the 1980 Mt. St. Helens volcanic eruption. The sediment is moving down the Cowlitz River in a continuous series of sand bars. The sand bars are approximately ten feet above the river bottom and still rising. The City has had to install a small steel dam in front of the intake to protect it from the rising sediment level. Any further rise from the point where the sandbars are now could result in leaving the intake high and dry, a complete mechanical failure, or both.

During a rain event in the winter of 2006/2007, as much as 10,000 pounds per day of silt were reportedly pumped to the Regional WTP from the intake. Neither the intake nor the plant was designed to be capable of sustained operation with that level of suspended solids in the raw water.

More recently, the river sediment problem has worsened. During July 2007, there was a minor earthquake centered on or near Mt. St. Helens that apparently caused a mudflow into the Toutle River, which is a tributary of the Cowlitz River. Shortly after the earthquake, the turbidity of the raw water entering the Regional WTP spiked from 20 NTU's to approximately 160 NTU's. The next week, a rain event caused another turbidity spike. As a result of the earthquake, an increased amount of sediment of a much smaller size has reached the Regional WTP.

The new, smaller size of sediment has been estimated at about ten percent of the size of last year's material. It has also resulted in what appears to be a long-term change in the water quality of the Cowlitz River. Whereas the summer turbidity used to be in the range of 2 to 4 NTU's, it is now up to 18 to 20 NTU's. Last year the river water was clear enough to see through to the bottom, but visibility is now limited to 9 to 10 inches. According to the available information, the Cowlitz River quality may not improve in the next 20 or more years.

The higher summer turbidity and higher solids loading make it more labor intensive and expensive to operate the Regional WTP.

C. Plant Limitations

Limitations caused by the high winter solids loading, the rising level of sediments in the river, intake deficiencies, the lack of adequate solids handling equipment, other equipment problems, and restrictions in the final effluent distribution piping, are such that the existing Regional WTP is limited to a peak day production capability of about 13 to 14 MGD during the summer. During the early winter of 2006/2007, the wintertime production rate was reduced to approximately 5 MGD at its lowest, due to turbid raw water. A production rate that low was inadequate for the City's needs during that period, and the Regional WTP could not meet demand. Fortunately, the City's storage reservoirs were able to provide the additional water during this period. However, the water reserves were seriously depleted.

The recent changes in the sediment and turbidity in the river (July 2007) will make these conditions worse.

III. Authorization

Due to problems with the existing Regional WTP, the City retained the team of PACE Engineers, Inc.; Robinson, Noble and Saltbush (groundwater geologists); and Cundiff Engineering (electrical engineers). The scope of work for the team consisted of identifying and evaluating various alternatives for providing capacity to treat and supply 20 MGD of potable water on a peak day.

A review committee was established to monitor the progress of this project, consisting of Jeff Cameron, Public Works Director; Craig Bozarth, City Engineer; Ivona Kininmonth, Staff Engineer; Ric Saavedra, Water Treatment Plant Manager; Gregg Hannon, Utility Administrator; Mr. Ray Johnson, Cowlitz P.U.D. Water Superintendent; and the PACE Engineers, Inc. team. A number of review meetings were held with this committee.

The work was divided into two phases. The first was to evaluate the alternatives to determine if it was economically feasible to build a new treatment plant at the Mint Farm industrial area. If it was economically feasible, the second phase involved drilling a test well at the Mint Farm to verify groundwater availability and quality.

IV. Phase I Alternatives Evaluated

A. Cost Estimates

The existing Regional WTP is over 60 years old, as previously mentioned. In order for it to be a reliable source for the next 20 years or more, considerable repairs are necessary. Tasks and estimated costs are shown in Table 1. Additionally, there could be other significant costs not yet identified, which may be required to bring the structures in accordance with regulations. A preliminary design review would need to be performed to develop an estimate of those costs.

B. Existing Intake

In spite of the age of the Regional WTP, the most significant issue is the status of the raw water intake on the Cowlitz River. The intake does not satisfy the regulations regarding fish protection and has internal hydraulic problems at current flow rates.

The worst problem with the intake is the build up of sediment in the Cowlitz River, which originates from Mt. St. Helens. Sediment in the river has been rising an estimated two feet per year. Three years ago, PACE Engineers assisted the City in installing a 4-ft tall dam in front of the intake to protect it from the sediment. Two years ago, the dam height was raised to eight feet, and last year the sediment rose above that. There does not appear to be sufficient water depth remaining to raise the dam further.

The existing Regional WTP has difficulty handling the amount of solids that enter the plant at times. As an example, three of the four raw water pumps have failed in the last year, and sediment in the flocculator compartments has to be manually removed several times per year. To draw 20 MGD from the Cowlitz River, a new intake would be required. In discussions with City staff, it was decided that any new intake needs to be able to keep most of the sediment out of the plant. Selecting intake equipment with that capability has proven difficult. Suppliers of two different types of screening devices have stated that an intake structure at least 140-ft long would be required for that purpose.

Representatives of Ranney collector equipment have stated that the location of the existing intake is probably not adequate for their needs. The Kelso Ranney collector/intake further down river is in a better location. Even based on the Kelso installation, five or six of those would be required to satisfy the water quantity needs of the Regional WTP.

Another intake alternative would be to sink a number of screened laterals into the sediment and sand, which would be similar to a shallow Ranney collector. Anchoring them in a river with rapidly moving sand and sediment bars is expected to be a problem. A significant number of laterals and a large intake structure would also be required due to the fine nature of the sediment.

None of the intake alternatives investigated appeared to offer a long-term solution to the sediment problems. As a result of these issues, everyone who has looked at this project, including the Corps of Engineers and the State Department of Health, has advised the City to stop using the Cowlitz River and find a new source of water.

C. Alternatives

Options A, B and C were originally considered in addition to questions being received by the City staff at City Council meetings. The intent of these options was to identify the most cost effective method of providing water.

During the investigations for this project, it was determined that there was a substantial source of water at the Mint Farm industrial area, which is located in the southwest part of the City, to the north of the Weyerhaeuser Paper Mill Facility.

A test well drilled at the Mint Farm verified the availability of an adequate supply of water, which was found to contain iron, manganese, and a small amount of arsenic. Treatment of the water would be required, and microfiltration was chosen as the best method of treatment. The following discussion describes the decision-making process that was used.

The alternatives evaluated by the team include the following:

Option A: Producing 10 MGD at the proposed microfiltration plant at the Mint Farm and producing 10 MGD at the existing Regional WTP was included as an option in response to the question received by the City staff as to why using a combination of two plants had not been considered. The idea behind this option was to build a smaller new treatment plant for everyday use, and use the existing plant for peak summer demand. Running the existing Regional WTP only in the summer would negate most but not all of the problems caused by sediment in the river. Under this option, both treatment plants would be operated at the same time in the summer, which would increase the operational requirements. The total capacity would then be 20 MGD between the two plants.

Option B: If Option A has not already been implemented, then Option B would be implemented, which would include all the costs for construction of a 20 MGD microfiltration plant at the Mint Farm.

Option C: Expand the existing Regional WTP from the current 14 MGD to 20 MGD.

Option D: Abandon the existing plant.

If Option B were implemented to develop 20 MGD at the Mint Farm, the existing Regional WTP could be abandoned. Although Option D is not a separate option *per se*, it was included to illustrate that water supply to Lake Sacajawea must be considered if the Regional WTP were abandoned. Water sent to the lake is currently raw water and is delivered to the lake directly from the main plant intake on Fisher's Lane.

Since raw water is currently sent to the lake, it is not a treatment issue. If the Regional WTP is abandoned, the raw water supply to the lake will be handled as a separate project.

Option E: Keep the existing Regional WTP at 14 MGD, with minor rehabilitation.

Keeping the existing plant at 14 MGD was included as a response to questions directed to City staff. As a part of this option, the City would have no additional water supply to handle either domestic or industrial growth or any other increase in future demand. In addition, the high volume of sediment in the river would still be a problem. Both these factors led to this option being abandoned.

D. Additional Source Alternatives

Several additional source alternatives were evaluated initially and then dropped from further consideration, as noted below.

1. Castle Rock

Preliminary discussions were held some years ago regarding the possibility of constructing a regional raw water intake at Castle Rock. However, when the intake was built approximately ten years ago, excess capacity for the City of Longview was not included.

An additional factor is that a 42-inch diameter, approximately 15-mile pipeline would be required to deliver raw water to the City's existing treatment plant on Fisher's Lane. The Review Committee determined that the cost of the pipeline would be too high for further consideration, especially since all the listed repairs would still have to be done at the existing treatment plant. Later this assertion was verified by a study which found the Castle Rock Intake Option to be approximately $43,000,000 more than building a new intake adjacent to the existing Regional WTP and rehabilitating and repairing the plant. In addition, sediment deposits in the pipeline would potentially result in high maintenance costs. As a result, this alternative was not considered further.

2. Chinook Ventures Wells

At the time the Master Plan Amendment was submitted, the City had just begun reviewing the Chinook Ventures site. The Chinook Ventures site has now been evaluated as part of the Emergency Response Plan and is currently being considered as a potential emergency supply option. The present owner of the Chinook site would like to hook-up to the City of Longview's water system but would not be abandoning the wells on site because there are future projects pending for that facility. At the present time, the Chinook Ventures site could provide approximately 3.2 MGD, at a cost of approximately $500,000. This would include pump and site improvements, backflow prevention, engineering and hooking up to the City of Longview's system. In order to supply 10 MGD, the cost of improvements would be approximately $2.5 million. Substantial work still needs to be done in regards to water quality, water rights, operation, costs, and other pending issues.

E. Additional Treatment Alternatives

The primary contaminants identified in the test well for this project were iron and manganese, with a trace amount of arsenic. These contaminants are easily treatable by microfiltration, greensand and, in some cases, pyrolucite.

1. Conventional Greensand Filtration

Traditionally, iron, manganese, and arsenic have been removed by conventional "greensand" filter media. Structures in the Mint Farm area are constructed on deep pilings, due to poor soil conditions. Greensand filtration results in larger, heavier structures than microfiltration and would, therefore, probably have higher costs. As a result, greensand filtration was not considered further for any of the options involving the Mint Farm area.

2. Pyrolucite

Pyrolucite is a higher rate media type filtration system than greensand. It would require less surface area, but uses much heavier media. It is our understanding that pyrolucite type medias are designed specifically for iron and manganese removal, which is the primary concern for the proposed facility. However, it is also our understanding that these medias may have long-term fouling issues with dissolved silica (SiO_2). Although this was not analyzed for in our test well, other wells in the area have recorded silica content. Also, in the event of an emergency, pyrolucite would be unable to treat the non-potable water available from the Weyerhaeuser Paper Mill.

F. Recommendations

The single most important factor in this analysis was the inadequacy of the existing raw water intake at the Regional WTP. The fish screens in the existing intake are not adequate to meet the current regulations for protection of fish, and they are not adequate to handle the very fine, silty sand that is accumulating in the river. Furthermore, there does not appear to be any cost effective way for either reconstructing the existing intake or constructing a new intake to resolve these issues. For this reason, options involving the existing Regional WTP are not viable. Building a new treatment plant at the Mint Farm appears to be the most reasonable option.

The committee recommends construction of a new treatment plant in the Mint Farm industrial area using microfiltration treatment equipment with a capacity of 20 MGD (Option B). Constructing a new 20 MGD plant has the lowest first cost of the options considered and also has the lowest operating cost, requiring fewer staff. It also eliminates the sediment problem at the existing plant.

The reasons for selecting microfiltration are primarily flexibility and the ability to handle potential changes in raw water quality, non-potable water from Weyerhaeuser, and stricter drinking water regulations that may be implemented in the future.

The City has an emergency inter-tie with the Weyerhaeuser facility south of the Mint Farm. However, the water from this source is not potable. In an emergency, it might be necessary for the City to treat the water from this source or an equivalent surface source. The raw water sample taken from our test well at the Mint farm was relatively high quality, despite the presence of iron, manganese, and arsenic. In our opinion, and that of City staff, microfiltration provides the best available treatment and is the best option for treating other potential water sources in the future. The City did not want to install a new system now and have to make major changes in the future.

Table 1
Regional Water Treatment Plant Source Analysis

Item	Tasks	Option A 10 MGD at New Mint Farm WTP and 10 MGD at Existing Plant	Option B New Mint Farm WTP at 20 MGD	Option C Expand existing plant to to 20 MGD (20-yr plan)
1.0	**Rehabilitate Existing Intake**			
1.1	Repair Intake Screen	N/A	N/A	Included below
1.2	Replace Pumps	N/A	N/A	Included below
2.0	**Build New Intake**			
2.1	River Crossing	$2,506,425	N/A	$2,506,425
2.2	Structure	$4,134,790	N/A	$5,134,790
2.3	Power	$600,000	N/A	$600,000
2.4	Property	$150,000	N/A	$150,000
2.5	Pumps	$607,200	N/A	$607,200
2.6	Fish Screens	$3,771,158	N/A	$5,683,265
2.7	Ramney Collector	N/A	N/A	6 ($1.85M each well only - disregarded)
2.8	Solids handling equipment	N/A	N/A	$334,720
2.9	Rebuild residual tanks	N/A	N/A	$251,520
3.0	**Rehabilitate Existing Plant**			
3.1	Re-build sludge collectors	$70,000	N/A	$105,000
3.2	Re-build sludge drives	$30,000	N/A	$30,000
3.3	Rebuild high head pumps	$50,000	N/A	$50,000
3.4	Replace sludge valves	$40,000	N/A	$40,000
3.5	Replace sludge valve actuators	$20,000	N/A	$20,000
3.6	Replace basin influent gate	$6,000	N/A	$6,000
3.7	Repair sedimentation basin	Complete	N/A	Complete
3.8	Seal inside of floc/sed basins	$180,000	N/A	$270,000
3.9	Stop leak in sludge sump well	$22,200	N/A	$22,200
3.10	Replace tube settlers	$140,000	N/A	$210,000
3.11	Repair outside facility lighting	$10,000	N/A	$10,000
3.12	On-going pipe painting (per yr)	$5,000	N/A	$5,000
3.13	Repair intake building roof	$5,000	N/A	$5,000
3.14	Recoat parking areas	$20,000	N/A	$20,000
3.15	Replace underdrain system	$600,000	N/A	$800,000
3.16	Replace main SCADA system	$597,600	N/A	$597,600
3.17	Repair effluent manifold	$144,000	N/A	$144,000
3.18	Repair pipe gallery	$648,000	N/A	$1,274,400
3.19	Replace lime feed system	$100,000	N/A	$100,000
3.20	Improve backwash piping	N/A	N/A	$150,000
3.21	Replace existing power supply	$1,856,000	N/A	$1,856,000
3.22	Finished water pipeline	N/A	N/A	$4,934,080
3.23	Raw water pipeline	Included below	N/A	$1,480,190
3.24	Air scour	N/A	N/A	$1,231,200
4.0	**Build Proposed New Plant**			
4.1	Driveway/ parking area	$82,560	$82,560	N/A
4.2	Three wells, pumps, controls	$1,334,520	$2,669,040	N/A
4.3	Treatment equipment	$3,786,820	$6,545,620	N/A
4.4	Treatment building/ foundation	$2,378,400	$2,378,400	N/A
4.5	Power supply/ electrical	$3,150,000	$3,150,000	N/A
4.6	Interconnecting piping	$500,000	$700,000	N/A
4.7	Mechanical building	$196,630	$196,630	N/A
4.8	Clearwell foundation	$476,760	$476,760	N/A
4.9	Distribution pumps	$169,330	$338,660	N/A
4.10	Backwash holding tank	$405,210	$405,210	N/A
4.11	Backwash pumps	$31,680	$31,680	N/A
4.12	Site piping	$911,240	$1,386,240	N/A
4.13	Distribution piping improvements	$448,670	$2,458,820	N/A
4.14	Chemical feed equipment	$256,290	$256,290	N/A
4.15	Land purchase	$378,000	$378,000	N/A
5.0	**Total**	$30,819,483	$21,453,910	$28,628,590

Notes:

1. The quantity of wells needed for the proposed plant could vary, depending on the results from the test well.
2. Chemical feed equipment in the proposed plant assumes use of liquid chlorine. Add $240,000 for using on-site chlorine generation.
3. The cost for the proposed plant does not include obtaining necessary easements.
4. The above total costs are for raw materials and installation do not include engineering fees and taxes.

Table 2
Annual Operating Costs for both Plants at 10 MGD Each

PRODUCTION	MINT FARM	REGIONAL WTP	COMBINED PLANTS
Water Treated (gallons)	3,650,000,000	3,650,000,000	7,300,000,000
CHEMICAL COST			
Total Annual Cost	$10,660.00	$97,910.00	$108,570.00
Cost / MG	$2.92	$26.82	$14.87
ADMINISTRATION COST [1]			
Total Annual Cost	$51,850.00	$51,850.00	$103,700.00
Cost / MG	$14.21	$14.21	$14.21
OPERATIONS COST [2]			
Total Annual Cost	$644,870.00	$519,940.00	$1,164,810.00
Cost / MG	$76.68	$142.45	$159.56
PERSONNEL COST [3]			
Total Annual Cost	$96,510.00	$289,530.00	$386,040.00
Cost / MG	$26.44	$79.32	$52.88
SUMMARY			
Total Annual Cost	$803,890.00	$959,230.00	$1,763,120.00
Cost / MG	$220.24	$262.80	$241.52

Notes:

1. The Administration cost for any option is assumed to be fixed at $103,700, but for this table the total is divided evenly between the two plants.
2. Operations costs for the proposed Mint Farm Plant consist of the power used by all pumps running for 24 hours plus the miscellaneous plant use at 10% of the total.
3. Operations costs for the Regional WTP consist of the Maintenance-Operating and Operations-Operating categories of the monthly budget.
4. Five employees currently work at the Regional WTP. If both plants are used, a minimum of six employees will be required: four employees at the existing Regional WTP, one at the proposed Mint Farm Plant, and one manager presiding over both plants (half time at the Regional WTP and half time at the Mint Farm Plant).

G. Recommended 20 MGD Treatment Plant Description

1. Wells

The new treatment plant is estimated to need five to six new wells to provide the necessary raw water capacity.

2. Oxidation/Disinfection

The presence of iron and manganese would require the addition of potassium permanganate and chlorine for oxidation and disinfection purposes. Arsenic typically attaches itself to the oxidation products and is removed as well. Removal was verified by lab tests by the microfiltration equipment supplier.

3. Screens

Following the chemical feed, pre-screening devices would be provided to eliminate solids and any silt or sand produced from the wells.

4. Treatment

The cost for microfiltration equipment has gone down to the point where it is cost competitive or even less expensive than conventional treatment. In addition, microfiltration membranes made from PVDF are available, which is impervious to potassium permanganate and chlorine, which would be necessary to treat the contaminants in the Mint Farm groundwater. The membrane manufacturer will also provide a process guarantee based on their own bench scale tests of a sample of the well water. These factors, including the lighter weight of the structure and higher quality product water, led the Review Committee to choose microfiltration treatment equipment for the proposed treatment plant at the Mint Farm. Eight to ten microfiltration units would be used, which would provide a considerable degree of redundancy in case of failure of any of them.

5. Final Effluent Storage/Pumping

The microfiltration units would discharge treated water to two parallel final effluent tanks (one to be constructed now, and one in the future). Having two units provides redundancy and a way to take one off line for maintenance. From there, six pumps would deliver finished water into the City's distribution system. Again, multiple units assure redundancy. Since the water is anticipated to be classified as groundwater, it is assumed that storage on site for disinfection contact time (CT) will not be required.

6. Distribution System

The Mint Farm location is on the opposite side of the city from the existing Regional WTP. However, water will be introduced into the distribution system in the same pressure zone, which will minimize the impact of moving the plant. Some improvements to the distribution system

would be necessary, however, to allow transmission of the full 20 MGD to the main pressure zone of Longview.

The distribution system improvements are already included in the cost estimate. They include approximately 750 ft of a 36-inch diameter treated waterline from the proposed Mint Farm Plant north to Memorial Park Drive. From there, the new pipeline would split: one side would connect to an existing 20-inch diameter pipe at that location, and the other side would have approximately 3,600 feet of a 24-inch diameter pipe that would travel east to connect to another existing waterline near the intersections of 32nd Avenue and Ocean Beach Parkway. The intent is to minimize or eliminate hydraulic issues related to feeding the distribution system from the opposite side of town than from the existing Regional WTP.

If Chinook Ventures' wells were used, significant additional costs would be incurred for rehabilitating their wells and extending a 36 to 42-inch pipeline from there to the proposed connection point to the distribution system. These costs have been estimated at approximately $2.5 million, and would be in addition to the other project costs listed previously.

7. Backwash Waste

The wastewater from the microfiltration units will be discharged to a pair of backwash waste tanks. One tank will be constructed as a part of this project, and another will be built in the future as required. Two waste pumps will be provided to allow recycling of the settled wastewater back to the plant, if desired. Discharge of the wastewater solids will be by gravity to the City's sanitary sewer system.

V. Phase II

Phase I of the report confirmed that constructing a new 20 MGD facility for treating groundwater at the Mint Farm industrial area is the most economically viable option. As a result, the City implemented Phase II, which was to drill a 6-inch test well at the end of Weber Avenue in the Mint Farm area. Robinson, Noble & Saltbush were the lead on this phase of the work.

A. Test Well

The test well confirmed that there is shallow groundwater over a significant confining layer, and then a second, large capacity artesian aquifer below that from 230 feet below ground level to bedrock at 368 feet below ground level.

The water level in the lower aquifer was pressurized to slightly above ground surface at the time of drilling and testing, which confirms that there is a significant confining layer between the aquifer and the surface and suggests that the water would be classified as groundwater without direct surface water influence.

B. Water Quality

The test well also confirmed the expected water quality was similar to the assumptions made in Phase I of the report. A report by a certified lab indicates that the iron is 0.97 parts per million (ppm), the manganese is 0.62 ppm, and the arsenic is 15 parts per billion (ppb). All of these are above the regulatory limits (0.3 ppm for iron, 0.05 ppm for manganese and 10 ppb for arsenic). However, they are all easily treatable. It is anticipated that potassium permanganate and chlorine will be used to oxidize the iron and manganese out of solution for removal by the microfiltration equipment. At the same time, it is expected that the arsenic will attach itself to the iron and be removed as well. A microfiltration equipment manufacturer is conducting bench scale studies on a sample of the water sent to them. Based on these tests, they will be prepared to offer a process guarantee on treating those contaminants.

C. Water Quantity

Test pumping of the well demonstrated a specific capacity of 44.4 gallons per minute per foot, indicating that the test well encountered a highly permeable aquifer. The transmissivity of the aquifer was calculated to be in excess of 1.7 million gallons per day per foot of aquifer width. Based on our analysis of the information available at this time, this aquifer can support the proposed production levels. It is anticipated that a single 20-inch well could produce in the neighborhood of 3,000 gallons per minute. Production of 20 MGD would require five wells of this capacity operating concurrently.

As the valley wall to the north is comprised of low permeability bedrock, the aquifer is expected to be limited in extent in a northerly direction. As a result, Robinson, Noble & Saltbush are recommending that the initial production wells be drilled starting in the south end of the Mint Farm area if possible.

D. Water Rights

A water right application has been prepared for the partial transfer and change in type of one of the City's water rights (S2-05233) for the existing surface water intake on the Cowlitz River to the proposed well field. The Department of Ecology has been consulted several times regarding this change in type and transfer and, at the time of our last meeting, fully supported the idea and looked forward to working with the City. The City has adequate water rights to meet their current and projected demand, so the application for the partial change and transfer of an existing water right is simpler than applying for a new water right. This application has not yet been delivered to Ecology as the project has not reached the point where making an application would be appropriate. The application has been prepared and will be submitted to the Department of Ecology upon acceptance of this amendment by the Department of Health. The City intends to use the Department of Ecology's cost-reimbursement program to expedite the processing of the transfer application.

VI. The City of Kelso and the Cowlitz County PUD

The City of Kelso does not own part of the existing Regional WTP and has no rights to the water. They do rely on this plant for an emergency water supply. The Cowlitz County PUD owns

approximately 15 percent of the plant, which provides them with 100 percent of their water supply. As such, the Cowlitz PUD has had a representative participating in the decision making process for this project, and it is our understanding that they are in favor of this project. Thus, the impacts of building the new plant will provide the Cowlitz County PUD with a more reliable water source capable of meeting both current and future demand, and the City of Kelso will have a more reliable emergency water supply.

The City of Kelso does "wheel" water through their system from the Longview distribution system to the Cowlitz PUD. However, since the proposed new plant at the Mint farm would connect to the main pressure zone, no hydraulic problems are anticipated.

VII. Final Recommendations

A. Recommendations

Both the Phase I and II portions of the project demonstrated the viability of constructing a new 20 MGD water treatment plant for groundwater at the Mint Farm industrial area. Therefore, we are recommending that the City pursue that option.

B. Schedule

From a scheduling point of view, the project is anticipated to take 30 to 33 months after the design work is begun to obtain a complete and operational new treatment plant under normal conditions. Water right changes and transfers and the construction of the required supply wells could also be accomplished during the same time frame. Pre-purchasing the major long-lead types of equipment could reduce the time frame to approximately 20 months. In either case, the City must be prepared to continue to make repairs and operate the existing Regional WTP with its current production limitations for at least the next two summers (2008 and 2009).

C. Financial

Applications have been submitted for funding most of the project with low interest loans. If successful, this project will be funded primarily by two Washington State loans: a $10,000,000 loan from the Public Works Trust Fund and an $8,000,000 loan from the Drinking Water State Revolving Fund. The applications for both of these have already been submitted and are currently under review. Since this is a multi-jurisdictional project, the remaining $9,500,000 plus any portion of the loans that are not successful will be jointly funded by the City of Longview and Cowlitz PUD by direct capital contributions using water system Revenue Bonds.